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## (54) Drinks container with a slitted flexible membrane

(57) A one-use drinks container 1 is closed apart from a valve 2 which comprises a flexible membrane with at least one self-closing slit. The slit allows liquid to be drawn from the container by suction alone and preferably remains closed in any orientation of the container unless suction is applied. The slit may accommodate a drinking straw 8 and seal the outer surface of the straw. The valve may be outwardly concave and may be protected by metal foil or a screw cap. The valve may be formed in an upstanding spout 9 which may have a tube 95 with a sharp edge 83 for piercing a wall of the container. The tube may extend to a lower part of the container to act as a drinking straw. The spout may have a flanged grommet seal 94 and may have a radially extending skirt 90 which forms a tight fitting over-lid for the container which may be a conventional drinks can 93. The container and spout may be provided separately so that a user can insert the spout into the container.

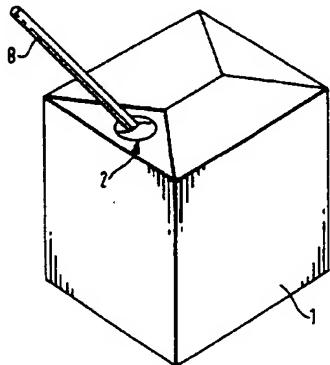


FIG. 7

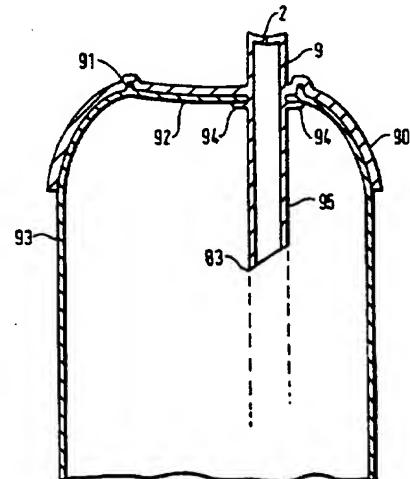


FIG. 9

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1995

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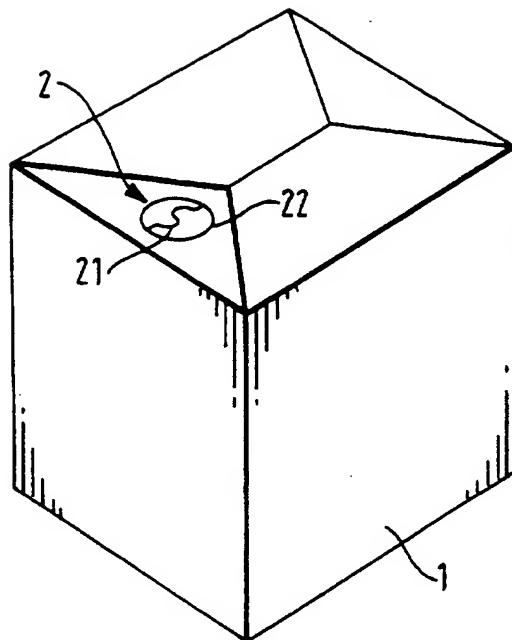


FIG. 1

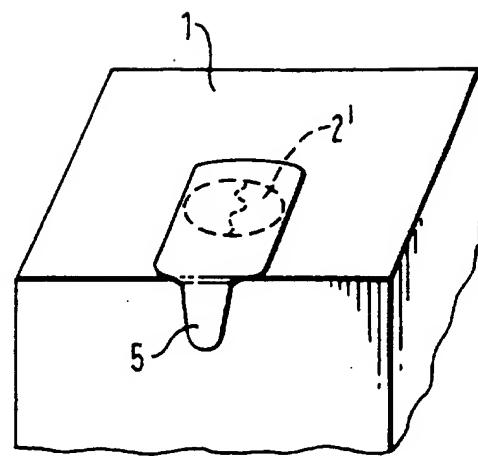


FIG. 2A

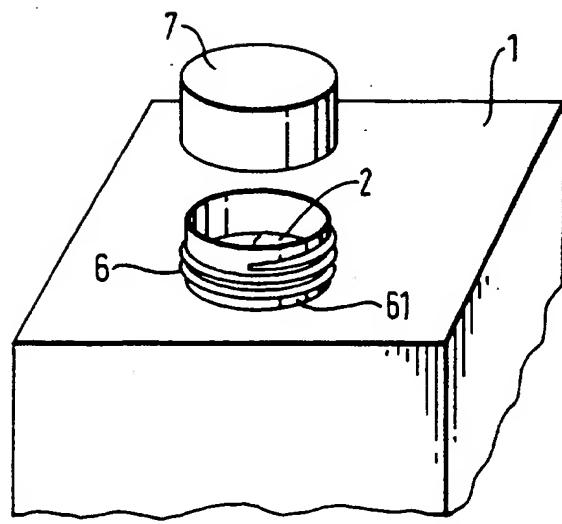


FIG. 2B

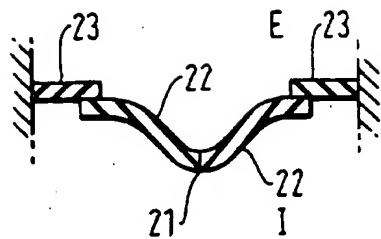


FIG. 3A

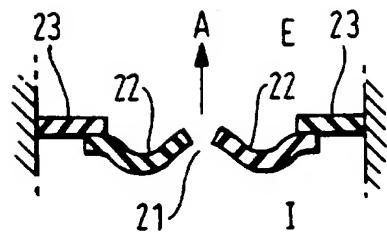


FIG. 3B

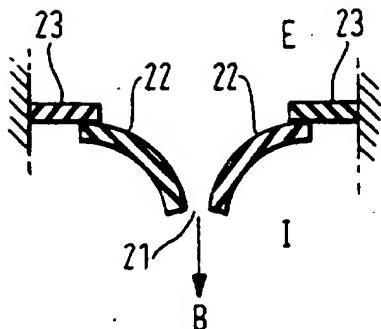


FIG. 3C

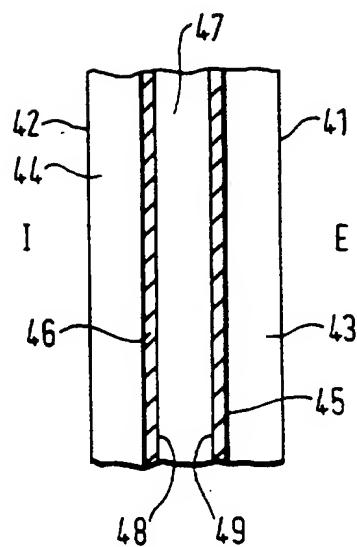


FIG. 5

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FIG. 4

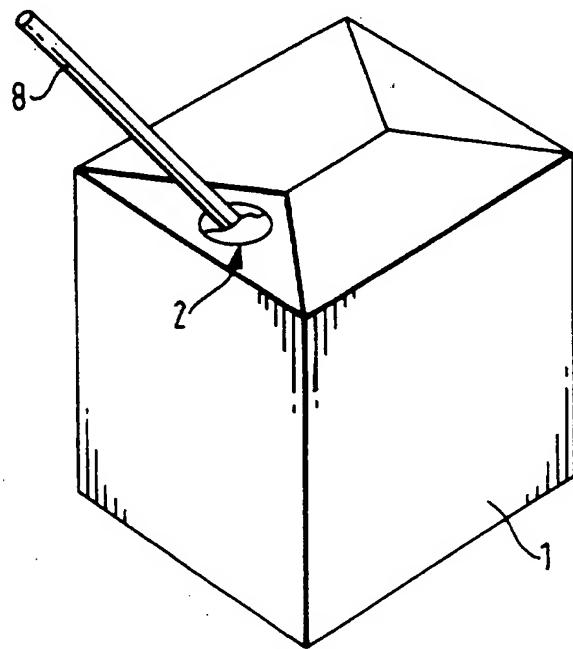
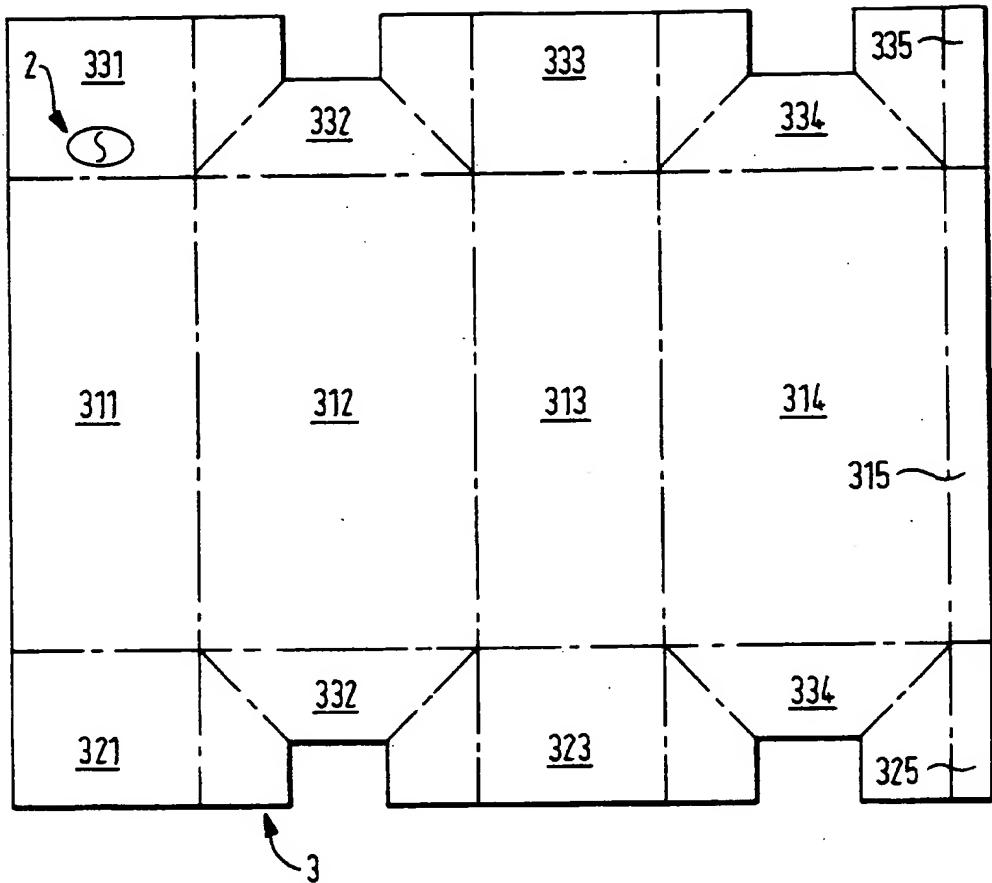
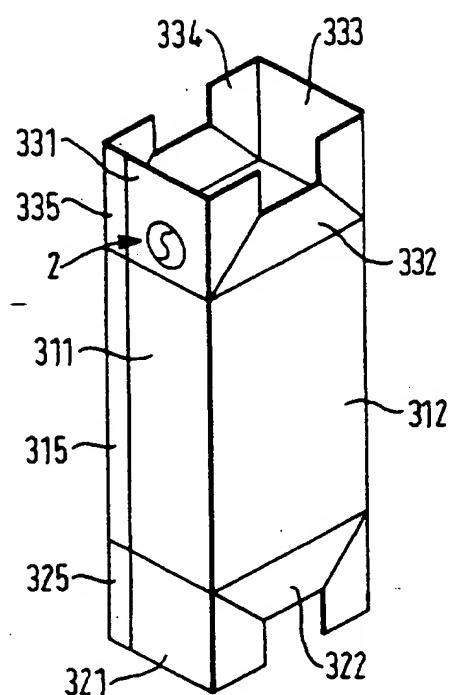
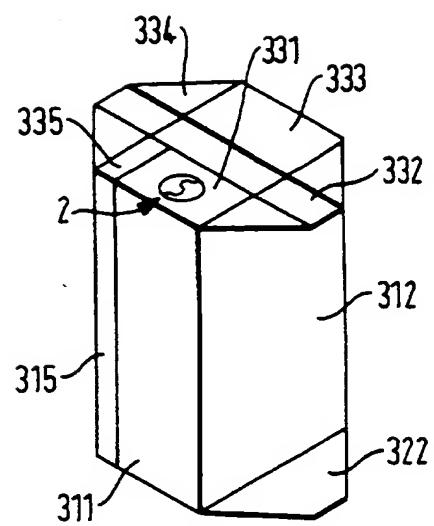


FIG. 7

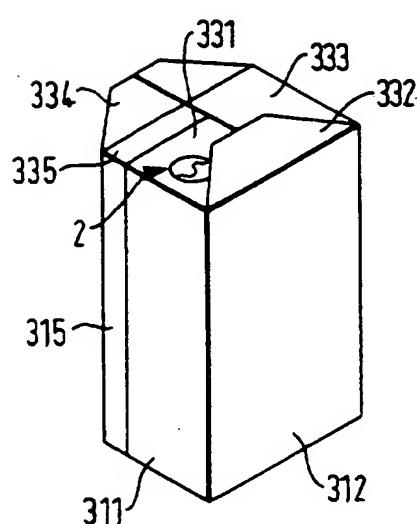
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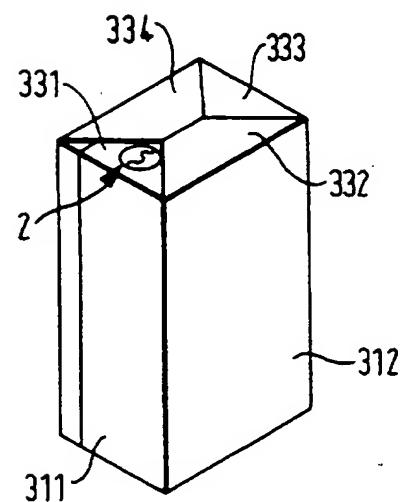
A



B



C



D

FIG. 6

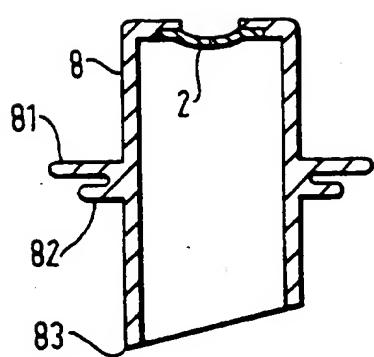


FIG. 8

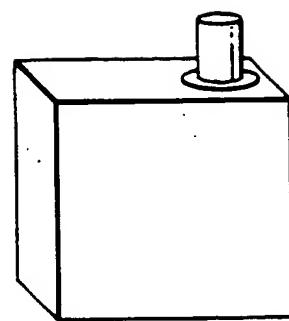


FIG. 8A

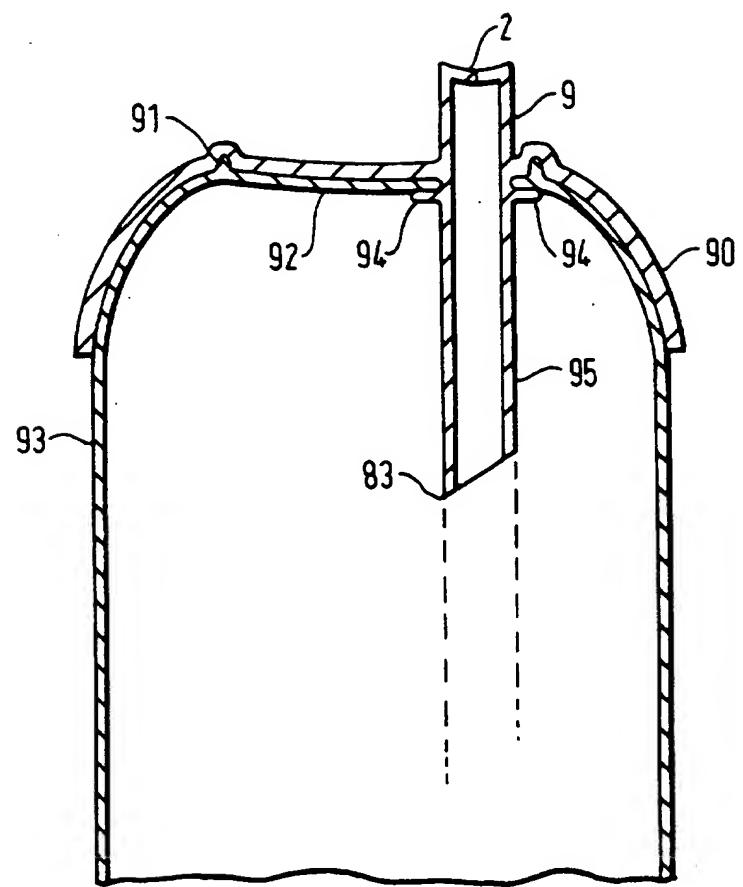


FIG. 9

DRINKS CONTAINER

This invention relates to drinks containers which are used to store potable liquids such as milk or fruit-flavoured drinks for sale and consumption.

Drinks cartons of various configurations are widely known in the art. Such cartons can be made cheaply from carton blanks which are folded and sealed and filled on a packaging machine, or they may be made from continuous lengths of packaging material which are formed into cartons in a form-and-fill machine in which the carton is formed and filled on the same machine.

The material of the carton is commonly biodegradable, at least in part, and its outer surface provides a surface for Trade Mark, product details and advertising matter.

The universal problem such cartons present to the user is how to open the carton to remove the stored liquid without spillage.

One common arrangement is to provide a portion which is torn or cut off. Another common arrangement has an opening which is covered by a metal foil seal which is ripped off to reveal the opening. Yet other arrangements are formed with carton panels which can be manipulated so as to force open a sealed edge and produce a construction resembling a spout. None of these arrangements are ideal. The liquid spills if the carton is knocked over.

One arrangement commonly employed for the sale of soft drinks is a carton formed from a carton blank in brick or block configuration when filled with liquid. Such carton has a small hole with a plastics or metallic film thereacross. This small hole is adapted to be pierced by the end of a drinking straw which is then inserted through the opening and enable the liquid inside to be drawn through the straw by a drinker. Such filled cartons are manufactured in their millions but are not ideal. Liquid can still escape through the straw or between the straw and the edge of the hole in the carton, particularly if the

carton is inadvertently tipped over.

Both alcoholic drinks and soft drinks are also widely sold in cans formed of aluminium or aluminium alloy or from steel and in some cases from substitute materials. Such cans or the top of such cans are commonly provided with a ring-pull. Grasping the ring and pulling it in an appropriate direction removes a small panel in the top of the generally cylindrical can from which drink can then be poured or into which a straw may be inserted. Similar problems arise. Once the ring-pull has been removed, if the can is then tipped over, a spill will result.

In my British Patent No: 2 266 045 I described a number of drinking vessels suitable for use as a trainer cup or cup for the elderly or infirm. Such drinking vessels comprised an open-mouthed generally cup-shaped container and a lid for covering the open mouth of the container. The lid has an associated mouthpiece. Valving in the form of a self-closing slit valve is provided to prevent flow of liquid from the interior of the container through the mouthpiece unless a predetermined level of suction was applied to the mouthpiece. The arrangement is such that a user could draw liquid through the mouthpiece by the sole application of suction thereto.

This arrangement has proved successful in overcoming the problem of spillage with trainer cups, a problem familiar to any parent of a young child. Notwithstanding this successful solution to a longstanding problem, the problem of preventing spillage in filled drinks containers has not, to the knowledge of the present applicant, been previously satisfactorily resolved. Any such solution, to be effective, must not only essentially prevent spillage; it must also be simple to manufacture and relatively inexpensive.

In accordance with the present invention, there is provided a one-use drinks container filled with a potable liquid to be taken therefrom by a consumer, the container having a plurality of walls and being closed apart from a valve through one said wall, which valve comprises a membrane of flexible material which is provided with at least one self-closing slit adapted such that liquid may be drawn from the interior of the container by the

sole application of a predetermined level of suction in the region of the valve.

The valve may be formed, for example, by a simple straight slit or by a cross-cut. In whatever configuration the slit or slits may be formed, it is an essential requirement that the slit or slits should be self-closing and self-sealing. In other words, in the absence of a predetermined level of suction, the valve should remain firmly closed so that there is no spillage. The valve member may readily be produced as a membrane which is co-moulded with the remainder of a spout, rather in the manner of the spout provided in the lid of my preferred embodiment of trainer cup manufactured in accordance with my aforesaid British Patent and which is now available for sale in the United Kingdom and elsewhere under the Trade Mark "ANYWAYUP CUP". The valve in the aforesaid cup is co-moulded with the spout and is dished inwardly of the container opposite the direction from which the liquid is taken. In the preferred arrangement, the valving is such that liquid can pass through the valve only when the aforesaid predetermined level of suction is applied and replacement air passes through the valve in the opposite direction to make up any deficiency resulting from suction.

As explained below, arrangements in accordance with the present invention can readily be provided in a number of different configurations applicable to different types of carton based drinks containers and cylindrical can configuration drinks containers.

The flexible material from which the valve is formed and in which the slit or slits are present is suitably arranged so that a drinking straw could be readily pushed through the slit or slits with the material around the edges of the slit or slits then conforming to the external surface of the drinking straw so as effectively to seal the outer side of the drinking straw and enabling someone who wishes to drink from the container by sucking through a straw rather than sucking simply in the region of the valve. Alternatively, as I shall explain, in particular embodiments, the valve can effectively be configured as an integral straw.

The invention is hereinafter more particularly described by way of example only, with reference to the accompanying drawings in which:;

Fig. 1 shows a perspective view of a drinks carton constructed in accordance with the present invention;

Fig. 2A shows one modification of the drinks carton of Fig. 1;

Fig. 2B shows a second and alternative modification of a drinks carton as shown in Fig. 1;

Figs. 3A, 3B and 3C are enlarged sectional views through one embodiment of valve for a drinks container constructed in accordance with the present invention illustrating how the valve operates;

Fig. 4 is a carton blank suitable for manufacturing a carton of the kind shown in Fig. 1;

Fig. 5 is a sectional view through composite material suitable for forming a carton blank as shown in Fig. 4;

Fig. 6A to D shows successive perspective views in one method of forming a carton of the kind shown in Fig. 1, using a blank as shown in Fig. 4;

Fig. 7 is a perspective view similar to Fig. 1, showing how a straw may be employed together with the carton;

Fig. 8 is a sectional view through a separate valve assembly useful with a drinks carton,;

Fig. 8A shows a perspective view on a reduced scale illustrating how the valve assembly of Fig. 8 may be employed in use; and

Fig. 9 is a sectional view through a can of drink with a valve assembly in place through the top of the can.

The one-use drinks container generally indicated 1 in Fig. 1 is of a configuration commonly used for storage and sale of consumable liquids (for example, milk or soft drinks) and comprises a paperboard carton, which may be lined with aluminium and/or polyethylene and is formed as a carton blank which is folded, sealed and filled on a suitable machine. Such cartons and the machines for forming and filling them are very well known in the art and it is deemed unnecessary to describe any such

carton or its manufacture and filling operations in detail because they will be very familiar to persons of ordinary skills in this art. One such carton is described and illustrated in US Patent No: 4 691 858 of Adolph Coors Company.

Shown in the top of carton 1 in Fig. 1 is a membrane 22 in which a slit 21 is formed. Although the slit is here shown with a "S" shape, it may be formed as a simple straight slit. Alternatively, it could be formed as a cross-cut.

In the arrangement of Fig. 1, the region of the membrane is exposed. As an aid to preventing contamination, the region of the slit may itself be covered by a metal foil seal 2' (see Fig. 2A) provided with an integral tab 5 which is grasped and then pulled upwards so as to detach the metal foil and expose the membrane 2.

Fig. 2B shows another way in which the membrane can be further protected. In this case, a generally cylindrical spout 6 formed on its exterior with a thread 61 is formed with or attached to the carton and a screw cap 7 with internal threads cooperates so as to close the spout effectively formed and so protect the membrane 2 within.

Figs. 3A, 3B and 3C illustrate how the valve may operate in one arrangement. In this arrangement, the interior is indicated I and the exterior E. The flexible material in which slit 21 is formed is indicated at 22 and may be co-moulded or alternatively adhered to the material 23 circumextending about the disc 22 of flexible material. The flexible material is suitably formed of a natural synthetic rubber or from a suitable plastics. In a preferred arrangement, it is formed of a block co-polymer sold under the Trade Mark EVOPRENE which comprises a styrene-ethylene-butylene-styrene copolymer. Under normal conditions, the valve remains closed, even if the container is overturned so that liquid bears against the valve on the interior I side.

However, when a predetermined level of suction is applied on the exterior E side of the valve, the valve opens generally as shown in Fig. 3B to allow liquid to flow from interior I to exterior E in the direction A. As liquid is withdrawn, pressure within the container reduces below atmospheric. If suction is

then removed, the valve will open in the opposite direction as shown in Fig. 3C to allow air to flow from exterior E to interior I in the direction of arrow B to make up for the withdrawn liquid and to equalise pressures.

It will be noted that in its neutral configuration (Fig. 3A) the valve is domed (in this case being concave outwardly). The effect of co-moulding the membrane to the surrounding material often causes it to stretch slightly. If the membrane were flat, the slit would tend to open as a result of such stretch, rendering the valve ineffective.

Fig. 4 shows a simple form of carton blank which can be folded along the score lines indicated so as to produce a carton generally as shown in Fig. 1. The valve is formed in one of the top panels 331. The score lines between panels 311, 312, 313, 314 and 315 are first folded and panels 311 and 315 joined so as to form a four sided tube. Panel 325 is attached to panel 321 and a composite bottom produced by folding up the panels 322 and 324 and then sealing the confronting faces of the panels underneath in superposed relation. Similarly, a composite top is formed by folding in the panels 332 and 334, panels 335 first having been adhered to panel 331. Other arrangements of carton can readily be envisaged by the man of ordinary skills in this art.

Fig. 5 shows a sectional view through a suitable composite material for forming the carton blank. Surface 41 is intended to form the exterior surface (E) while surface 42 is intended to form the interior surface (I). Interior and exterior surfaces may comprise a layer of plastics sheet material 44, 43 respectively. Layer 43 is bonded to one side of a paperboard material 47 by a suitable adhesive 45. Similarly layer 44 is bonded to the opposite side of the paperboard 47 by a second adhesive layer 46. Plastics layer 44 of the interior surface 42 suitably provides an impervious vapour and liquid barrier suitable for storing a filled product without spoilage. Plastics layer 43 suitably provides an abrasion-resistant surface. These plastic layers may comprise linear, low strength blends, or coextrusions or low density polyethylene. The adhesive is

suitably a hot melted adhesive and the paperboard may be a natural Kraft board.

Figs. 6A to D show successive stages in forming and folding the carton of Fig. 4.

As shown in Fig. 7, a straw 8 may be inserted through the slit in flexible membrane 2.

The valve membrane can be provided as part of the inner 44 or outer 43 plastics layer. In other words, to form the valve, one need simply strip off the other layers in its immediate vicinity and then form a cut to provide the slit.

The valve does not need to be formed in the carton itself. It can be formed as an entirely separate member which may be inserted into the carton either at the point of manufacture or subsequently.

Reference is made to the sectional view of Fig. 8 which shows the co-moulded or integral valve 2 formed in a spout 8 which is formed with a flange-like grommet seal 81, 82 on its exterior surface. Spout 8 is generally cylindrical but is chamfered at its lower end so as to provide a sharp edge at 83 which may be inserted into the material of an otherwise closed carton. By pushing the valve spout inwardly, the smaller of the two flexible flanges 82 will pass the edge of the resultant hole in the carton top whilst the larger of the two flexible flanges 81 remains on the outer side of the carton. Once the spout has been inserted, the arrangement will work exactly in the same fashion as for the embodiment of Fig. 1 except that there is provided in effect an upstanding valve spout on the outer side of the carton as shown in the reduced scale view of Fig. 8A. As explained, the spout can be provided separately from a fully filled carton, being inserted into the carton by the user. Alternatively, it can be formed in the carton at the time of filling the carton, or subsequently, or may be pushed into a pre-formed hole in a carton blank prior to forming and filling of the carton.

Fig. 9 shows a corresponding arrangement applicable to an aluminium, aluminium alloy or steel can. The spout 9 in this case is formed in effect as a tight fitting over-lid 90 which

fits over the seals 91 between the top 92 and cylindrical sidewall 93 of a conventional drinks can as discussed above. The spout 9 is formed with a chamfered end 83 as in the Fig. 8 arrangement which may be hard and sharp enough to pierce the thin top wall of the drinks can. Alternatively, the lid 90 may be applied over the top of the drinks can after removing a ring pull and the end 83 is then pushed through the resultant opening until grommet seals effectively seal against the edge of the can at 94. Sharp edge 83 may be formed at the end of a tube 95 which effectively extends almost to the interior bottom surface of the can of drink and may then itself act as a straw when suction is applied at the valve 2.

The can may be manufactured with the close fitting over-lid 90 or this may be supplied for use by a customer. In any arrangement in which a carton such as that shown in Fig. 8A or a can of drink such as that shown in Fig. 9 is supplied at retail with the spout integrally in place, a dust cap (not shown) is desirably supplied to fit over the exposed top end of the spout to prevent ingress of foreign matter. If preferred, the outer surface of the spout 8, 9 may be screw-threaded and the cap may be internally threaded.

CLAIMS

1. A one-use drinks container filled with a potable liquid to be taken therefrom by a consumer, the container having a plurality of walls and being closed apart from a valve through one said wall, which valve comprises a membrane of flexible material which is provided with at least one self-closing slit adapted such that liquid may be drawn from the interior of the container by the sole application of a predetermined level of suction in the region of the valve.
2. A one-use drinks container according to in Claim 1, in which the pressure of liquid inside the container is alone insufficient to open the valve, the valve remaining closed in any orientation of the container unless suction is applied.
3. A one-use drinks container according to Claims 1 or 2, in which liquid may be drawn through a drinking straw inserted into the slit, the material at the edges of the slit(s) being adapted to conform to the external surface of the drinking straw so as to effectively seal the outer side of the drinking straw.
4. A one-use drinks container according to any preceding claim, in which the valve is domed, being concave outwardly.
5. A one-use drinks container according to any preceding claim, in which the valve is formed in an upstanding spout, preferably at its distal end.
6. A one-use drinks container according to Claim 5, in which the spout is provided with a tube having a sharp edge, the one-use drinks container being formed by piercing an otherwise closed container with the sharp edge to insert the tube through a wall of the otherwise closed container.
7. A one-use drinks container according to Claim 5 or 6, in which the spout is formed with engagement means capable of

engaging with said one wall of the container and forming an effective seal.

8. A one-use drinks container according to Claims 5, 6 or 7, in which the engagement means is a flange-like grommet seal.

9. A one-use drinks container according to any of claims 5 to 8, in which the spout has a tube extending inwardly of the container substantially to an opposite wall thereof, whereby it may function in the manner of a drinking straw in use.

10. A one-use drinks container according to any of claims 5 to 9, in which the spout further comprises a radially extending skirt forming a tight fitting over-lid.

11. A one-use drinks container substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

12. The combination of a closed drinks container filled with a potable liquid and a spout provided with a tube having a sharp edge, the tube being adapted for piercing of a wall of the container by a user, and the spout including a valve therein, preferably at its distal end, the valve comprising a membrane of flexible material which is provided with at least one self-closing slit adapted such that liquid may be drawn from the interior of the container by the sole application of a predetermined level of suction in the region of the spout.

13. The combination of a closed drinks container filled with a potable liquid, and a spout provided with a radially extending skirt adapted to form a tight-fitting over-lid for the closed container, the container having an openable region through which a tube forming an extension on the underside of the overlid is adapted to extend when the over-lid is tightly engaged with the container, the spout including a valve therein, preferably at its distal end, the valve comprising a membrane of flexible material

which is provided with at least one self-closing slit adapted such that liquid may be drawn from the interior of the container by the sole application of a predetermined level of suction to the spout.

14. The combination of Claim 13, in which the container comprises a can with a ring-pull opening.

15. A method of forming a one-use drinks container comprising the steps of providing a container having a plurality of walls and filled with a potable liquid, and a spout, provided, preferably at one end, with a valve comprising a membrane of flexible material which is provided with at least one self-closing slit, a sharp edge at the other end, and engagement means capable of engaging with said one wall of the container; piercing a wall of the container with the sharp edge of the spout; and inserting the spout into the container so that the engagement means engages the edges of the hole so produced, sealing the container so that the liquid may be drawn from the interior of the container by the sole application of a predetermined level of suction in the region of the valve.

16. A method of forming a one-use drinks container substantially as hereinbefore described with reference to and as shown in Figures 7 and 8 of the drawings.



The  
Patent  
Office

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Application No: GB 9623145.1  
Claims searched: 1-11,15

Examiner: Michael Logan  
Date of search: 6 June 1997

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.O): A2B (BAAB); A4A (ALN, ALX); B8D (DCF8); B8P (PG2); B8T (TDAX, TWG, TWP, TWQ)

Int CI (Ed.6): A47G 19/22 21/18; A61J 9/00; B65D 5/72 5/74 17/00 47/06 47/20; B67B 7/48

Other: Online: WPI

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
Y	GB 2170791 A (WYETH) see all figures	1-8
X	GB 2158049 A (PROCTER & GAMBLE) see page 3, lines 26-37, and figs 5, 7 and 8	1-5
Y	GB 2015350 A (L'OREAL) see figs 1-3	1-8
X,P	WO 96/15978 A1 (TETRA LAVAL) see figs 1-3	1,3,5-9,15
X	US 5186347 (FREEMAN) see column 2, line 48 - column 3, line 7	1,2,5,10

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.